

Subpart O—Emission Regulations for New Gasoline-Fueled Otto-Cycle Light-Duty Vehicles and New Gasoline-Fueled Otto-Cycle Light-Duty Trucks; Certification Short Test Procedures

SOURCE: 58 FR 58426, Nov. 1, 1993, unless otherwise noted.

§86.1401 Scope; applicability.

(a) This subpart contains CST procedures for gasoline-fueled Otto-cycle light-duty vehicles, and for gasoline-fueled Otto-cycle light-duty trucks, including those certified to operate using both gasoline and another fuel (for example, “flexible-fuel” or “dual-fuel” light-duty vehicles and light-duty trucks). For the purposes of the Certification Short Test, flexible-fuel or dual-fuel vehicles will be treated as dedicated gasoline vehicles. This subpart applies to 1996 and later model years.

(b) References in this subpart to engine families and emission control systems shall be deemed to refer to durability groups and test groups as applicable for manufacturers certifying new light-duty vehicles and light-duty trucks under the provisions of subpart S of this part.

[64 FR 23922, May 4, 1999]

§86.1402 Definitions.

The definitions in §86.096-2 apply to this subpart.

§86.1403 Abbreviations.

The abbreviations in §86.096-3 apply to this subpart.

§86.1404 [Reserved]

§86.1405 Introduction; structure of subpart.

(a) This subpart describes equipment and the procedures required to perform the CST on gasoline-fueled Otto-cycle light-duty vehicles and gasoline-fueled Otto-cycle light-duty trucks (including those certified to operate using both gasoline and another fuel). Subpart A of this part sets forth the testing requirements, reporting requirements and test intervals necessary to comply with EPA certification procedures, sub-

part G of this part sets forth the requirements for Selective Enforcement Auditing of light-duty vehicles, subpart H of this part sets forth the standards for in-use testing, subpart K of this part sets forth the requirements for Selective Enforcement Auditing of light-duty trucks, and part 85, subpart W of this chapter sets forth the testing requirements for inspection and maintenance testing (which also may be utilized as part of the CST as defined in this subpart).

(b) Three topics are addressed in this subpart. Sections 86.1406 through 86.1413 set forth specifications and equipment requirements; §§86.1416 through 86.1426 discuss calibration methods and frequency; and test procedures and data requirements are described in §§86.1427 through 86.1442.

§86.1406 Equipment required and specifications; overview.

(a) *Exhaust emission tests.* All vehicles subject to this subpart are tested for exhaust emissions.

(1) *Dynamometer.* (i) When a CST employs steady state loaded operation, the dynamometer must be adjusted to the lowest available inertia weight setting and must meet the load speed relationships described in §86.1439(d). When a CST employs transient loaded warmup operation or loaded preconditioning, the dynamometer must be adjusted to the power absorption unit and inertia weight settings as described in §86.129 of this part.

(ii) All other requirements of this paragraph are set forth in §§85.2230 and 85.2233 of this chapter.

(2) *Exhaust gas analysis system.* (i) The requirements for the exhaust gas analysis system are set forth in §§85.2225 and 85.2233 of this chapter, except that the NO channel is optional. For the purposes of the CST, non-dispersive infrared analyzers are specified for measuring emissions.

(ii) If desired, the line extending between the sample probe and the analyzer may be insulated to minimize condensation.

(b) *Fuel and analytical tests.* Fuel requirements for the CST are specified in §§86.113, 86.213, and 86.1413.

[58 FR 58426, Nov. 1, 1993; 59 FR 33913, July 1, 1994]

§§ 86.1407–86.1412 [Reserved]

§ 86.1413 Fuel specifications.

(a) The test fuel to be used for the CST test options described in tables O-96-1 and O-96-2 of § 86.1430(b) must conform to the specifications listed in paragraph (b) of this section except that for manufacturer data submittal testing for the purposes of obtaining a certificate of conformity and for Selective Enforcement Audit testing, the octane specification of the fuels does not apply. For all gasoline-fueled Otto-cycle light-duty vehicles and gasoline-fueled Otto-cycle light-duty trucks (including those certified to operate using both gasoline fuel and another fuel), CST procedures performed for the purpose of obtaining a certificate of conformity must be conducted using the appropriate gasoline fuel only, as indicated in paragraph (b) of this section.

(b) *CST test fuels by option.* (1) Test Option 1: Use Cold CO fuel as specified in the table in § 86.213-94.

(2) Test Option 2: Use Cold CO fuel, as specified in the table in § 86.213-94; optionally, the Administrator may substitute Otto-cycle test fuel, as described in § 86.113-94(a)(1).

(3) Test Option 3: Use Otto-cycle test fuel as specified in the table in § 86.113-94(a)(1).

§§ 86.1414–86.1415 [Reserved]

§ 86.1416 Calibration; frequency and overview.

(a) Calibrations are performed as specified in § 85.2233 of this chapter, with the exception that the calibrations performed at 72 hour intervals in § 85.2233(e) of this chapter are instead performed prior to each CST.

(b) At least monthly, or after any maintenance which could alter calibration, the calibration of the analyzer must be checked. The analyzer must be adjusted or repaired as necessary.

(c) Water traps, filters, and conditioning columns must be checked before each test, and adjusted, repaired or replaced as necessary.

(d) Other equipment used for testing must be calibrated as often as necessary in accordance with good engineering practice.

§§ 86.1417–86.1421 [Reserved]

§ 86.1422 Analyzer calibration.

(a) Determine that the analyzer has met the acceptance criteria specified in § 85.2225 of this chapter.

(b) *Initial and periodic check.* Prior to its introduction into service and at specified periods thereafter, the analyzer must receive calibration in accordance with § 85.2233 of this chapter and with good engineering practice.

§§ 86.1423–86.1426 [Reserved]

§ 86.1427 Certification Short Test procedure; overview.

(a) The test procedure described in this subpart is designed to measure raw concentrations of CO (percent) and HC (parts per million) in the exhaust flow under conditions and test modes that may be encountered in the conduct of the Emission Control System Performance Warranty Short Tests, described in part 85, subpart W of this chapter. Emission sampling may occur during idle, 2500 rpm, and loaded modes. Specific conditions defined by this test procedure include fuel characteristics, ambient temperature, and waiting periods prior to being tested.

(b) *Testing by the manufacturer for certification data submittal.* (1) The options provided for testing under this subpart include a cold temperature test with Cold CO fuel, a moderate temperature test with Cold CO fuel, and a warm temperature test with FTP Otto-cycle test fuel, as described in table O-96-1 of § 86.1430. The manufacturer must complete testing for the data submittal (as required by the provisions of § 86.096-23(c)) under a minimum of one of these scenarios.

(2) In addition to testing under one of the sets of conditions specified in this subpart, the manufacturer may optionally test under conditions outside the ranges specified in this subpart.

(c) *Testing by the Administrator.* The Administrator reserves the right to conduct testing in accordance with the test procedures described in § 86.1439, under test conditions within the ranges specified in this subpart. The options provided for testing under this subpart include a cold temperature test with Cold CO fuel, a moderate temperature

test with Cold CO fuel, a moderate temperature test with Otto-cycle test fuel, and a warm temperature test with Otto-cycle test fuel, as described in table O-96-2 of § 86.1430. In order for an engine family to be eligible for certification, each of its test vehicles that is subjected to one or more CSTs must obtain a passing result for each combination of fuel, temperature, and test procedure employed in those CSTs, subject to the Administrator's discretion.

(d) *Alternative test procedures and exemptions.* (1) The manufacturer may request an exemption from any specific test(s) described in § 86.1439 for any engine family for which the specific test(s) is not appropriate. The requester will supply relevant test data and technical support to substantiate the request for an Administrator-granted exemption.

(2) The manufacturer may request alternative test procedures for any engine family for which none of the test procedures described in § 86.1439 is appropriate. The alternative test procedure(s) must be approved in advance by the Administrator in accordance with the provisions of § 85.2208 of this chapter.

(3) If the manufacturer does not submit a written application for use of alternative test procedures or for exemptions from specific test procedures described in § 86.1439 but the Administrator determines that an engine family is not susceptible to satisfactory

testing by the procedures set forth in this part, the Administrator shall notify the manufacturer in writing and set forth the reasons for such rejection in accordance with the provisions of § 86.090-22(c).

(4) The emission control information label for any vehicle for which approval of exemptions or alternative test procedure(s) has been granted must note such approval, in accordance with § 86.096-35, in order for the exemptions or alternative procedures to be effective for that vehicle.

§§ 86.1428-86.1429 [Reserved]

§ 86.1430 Certification Short Test sequence; general requirements.

(a) The following sequence lists the major steps encountered during the CST. These steps are described in paragraph (b) of this section and in §§ 86.1432, 86.1437, 86.1438, and 86.1439. Testing conducted for the manufacturer's data submittal must be in accordance with the provisions of §§ 86.096-23 and 86.1442.

(1) *Test conditions and procedures.* (i) *Manufacturer's data submittal.* Test conditions must be selected from table O-96-1 of paragraph (b) of this section. Further, the vehicle preparation and test run must be those described in §§ 86.1432 and 86.1437. Figure O96-1 shows the steps encountered as the test vehicle undergoes the procedures subsequently described.

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(ii) *Testing by the Administrator.* Test conditions are selected from among the set of conditions in table O-96-2 of paragraph (b) of this section. Further, one or more CST(s) are performed in accordance with the provisions of §§ 86.1432, 86.1438, and 86.1439. Figure O96-2 shows the steps encountered as the test vehicle undergoes the procedures subsequently described.

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(2) *Fuel tank drain and refill, or transient test procedure.* Fuel tank drain and fill is performed or a transient test procedure is performed, as described in §86.1432(b).

(3) *Soak*. A soak lasting up to 36 hours in duration may optionally be performed as specified in § 86.1432(c).

(4) *Warmup operation*—(i) *Manufacturer's data submittal*. The test vehicle may optionally be administered the first 505 seconds of the Urban Dynamometer Driving Schedule (UDDS), as described in § 86.1432(d)(1). If the test vehicle was subjected to a Cold CO Test Procedure in lieu of the steps listed in paragraphs (a) (2) through (4) of this section, it will not receive a warmup.

(ii) *Testing by the Administrator*. (A) If the test vehicle has not been subjected to a transient loaded test procedure as permitted in § 86.1432(b)(2) prior to the wait time, or if the vehicle has undergone a soak period exceeding 60 seconds, the test vehicle must be administered, at minimum, the first 505 seconds of the UDDS, as described in § 86.1432(d)(2).

(B) If the test vehicle is exposed to ambient temperatures outside of the specified temperature range between an initial test and a retest, it will receive a full UDDS, as described in § 86.1438.

(5) *Wait time*—(i) *Manufacturer's data submittal*. A 25 to 30 minute vehicle wait time of free idle, with optional engine off/restart cycles, must be performed as specified in § 86.1437(b).

(ii) *Testing by the Administrator*. A three to 30 minute vehicle wait time of free idle with optional engine off/restart cycles must be performed as specified in § 86.1438(b).

(6) *Preconditioning*—(i) *Manufacturer's data submittal*. Optional preconditioning

consisting of 2500 rpm (± 300 rpm) idle operation or loaded operation at 30 mph to 50 mph (48 kph to 80 kph) may be performed for 25 to 30 seconds as specified in § 86.1437(c).

(ii) *Testing by the Administrator*. Preconditioning consisting of 2500 rpm (± 300 rpm) idle operation or loaded operation at 30 mph to 50 mph (48 kph to 80 kph) must be performed for a minimum of 30 seconds as specified in § 86.1438(c).

(7) *Test procedure*—(i) *Manufacturer's data submittal*. The test procedure consists of the Two Speed Idle Test (first chance only), which is performed as specified in § 86.1437 (e) through (g).

(ii) *Testing by the Administrator*. The Administrator will perform one or more test procedures described in § 86.1439. For recall program testing, in-use vehicles will be set to the manufacturer's specifications, if appropriate.

(b) The sets of test conditions identified in this subpart are based on the test fuel type present in the vehicle fuel tank and the ambient temperature during the test. Tables O-96-1 and O-96-2 outline the specific ranges of conditions to be employed in the CST. The manufacturer must perform the CST described in this subpart under at least one of the three sets of conditions shown in table O-96-1 for data submittal under the provisions of § 86.096-23. The set of conditions selected is the one that, in the manufacturer's best judgment, represents the worst case, meaning the highest probability that the test vehicle would fail.

TABLE O—96-1—SETS OF CONDITIONS TO BE EMPLOYED FOR MANUFACTURER'S DATA SUBMITTAL IN THE CST

	Test Option 1	Test Option 2	Test Option 3
	Cold Temperature	Moderate Temperature	Warm Temperature
Fuel Type	Cold CO fuel (see table in § 86.213-94).	Cold CO fuel (see table in § 86.213-94).	Otto-cycle test fuel (see table in § 86.113-94(a)(1))
Ambient temperature	15 °F—25 °F (–9 °C—–4 °C)	68 °F—86 °F (20 °C—30 °C) ...	86 °F—96 °F (30 °C—36 °C)

TABLE O—96-2—SETS OF CONDITIONS TO BE EMPLOYED BY THE ADMINISTRATOR IN THE CST

	Test Option 1	Test Option 2	Test Option 3
	Cold Temperature	Moderate Temperature	Warm Temperature
Fuel Type	Cold CO fuel (see table in § 86.213-94).	Otto-cycle test fuel or Cold CO fuel (see table in § 86.113-94(a)(1) or in § 86.213-94).	Otto-cycle test fuel (see table in § 86.113-94)

TABLE O–96–2—SETS OF CONDITIONS TO BE EMPLOYED BY THE ADMINISTRATOR IN THE CST—Continued

	Test Option 1	Test Option 2	Test Option 3
	Cold Temperature	Moderate Temperature	Warm Temperature
Ambient temperature	15 °F–25 °F (–9 °C––4 °C)	68 °F–86 °F (20 °C–30 °C) ...	86 °F–96 °F (30 °C–36 °C)

(c) For testing conducted in accordance with this subpart, the ambient temperature to which the test vehicle is exposed must not fall outside the range specified in this paragraph.

(1) *For the cold temperature compliance pathways—(i) For the manufacturer's data submittal.* The ambient temperature for the steps following the fuel drain and fill or transient test procedure must remain between 15 °F and 25 °F (between –9 °C and –4 °C).

(ii) *For testing by the Administrator.* The ambient temperature for the remainder of the compliance pathway beginning with the step following the fuel drain and fill must remain between 15 °F and 68 °F (between –9 °C and 20 °C). In addition, from the warmup operation step (if performed) or the wait time step forward through the remainder of the CST, the ambient temperature must be maintained within ± 5 °F (3 °C) of the selected ambient temperature of the CST.

(2) *For the moderate and warm temperature compliance pathways—(i) For the manufacturer's data submittal.* The ambient temperature for the steps preceding the warmup operation (if performed) or the wait time (if no warmup is performed) must remain within the specific ambient temperature range selected for the CST, that is, either moderate or warm, as specified in table O–96–1.

(ii) *For testing by the Administrator.* The ambient temperature for the steps preceding the warmup operation (if performed) or the wait time (if no warmup is performed) must remain between 68 °F and 96 °F (between 20 °C and 36 °C), except as provided in paragraph (c)(3) of this section.

(iii) The warmup operation (if performed) and the entire test run from the wait time forward, as described in § 86.1437 or § 86.1438, must remain within the specific ambient temperature range selected for the CST, that is, either

moderate or warm, as specified in tables O–96–1 and O–96–2.

(3) *For testing by the Administrator only.* If Cold CO fuel is selected in conjunction with the moderate temperature compliance pathway, the specific provisions described in paragraphs (c)(3) (i) and (ii) of this section apply.

(i) The ambient temperature must be maintained within the moderate temperature range, as specified in table O–96–2, from the drain and fuel step forward throughout the remainder of the compliance pathway.

(ii) The ambient temperature of the test cell may not exceed 80 °F (27 °C) for the warmup operation (if performed) nor for the entire test run from the wait time forward, as described in §§ 86.1438 and 86.1439.

(d) If the engine stalls at any time during the test run, the CST is void unless the stall falls during the wait time within the guidelines for engine off time described in § 86.1437 (b) and (d) and § 86.1438(d)(1)(i).

[58 FR 58426, Nov. 1, 1993; 59 FR 33913, July 1, 1994]

§ 86.1431 [Reserved]

§ 86.1432 Vehicle preparation.

(a) The test conditions to be employed in the CST procedure must be selected from the applicable options specified in table O–96–1 or table O–96–2 of § 86.1430(b). The fuel tank must be fitted, as required, to accommodate a fuel drain at the lowest point possible in the tank(s) as installed on the vehicle.

(b) *Fuel tank drain and fill, or transient test procedure—(1) CST performed as a stand-alone procedure.* For the first CST compliance pathway performed as a stand-alone procedure on a particular test vehicle, the fuel tank(s) must be filled to approximately the prescribed “tank fuel volume” (as defined in § 86.082–2) with the specified test fuel.

For the cold temperature compliance pathway, the temperature of the fuel prior to its delivery to the fuel tank must be less than or equal to 60 °F (16 °C). If the existing fuel in the fuel tank(s) does not meet the specifications contained in § 86.1413 and § 86.1430(b), the existing fuel must be drained prior to the fuel fill as specified above. Other refueling during a CST may not be performed. Draining and refueling between successive CSTs is allowed and is required prior to any CST for which the specified fuel is different than that existing in the tank(s). Any soak or operation that follows this step, until the conclusion of the CST sequence, must occur at an ambient temperature that is within the allowable temperature range described in § 86.1430(c).

(2) *CST performed in sequence with other confirmatory testing.* Certain complete confirmatory test procedures, as indicated in paragraphs (b)(2) (i) and (ii) of this section, may be substituted for the vehicle preparation steps described in paragraph (b)(1), (c), and (d) of this section. If the vehicle is to be subjected to one or more of these other confirmatory test procedures, the vehicle is prepared in accordance with the applicable complete procedures from the point of fuel drain and fill.

(i) *Manufacturer's data submittal.* The only test procedure that the manufacturer may select to substitute for paragraphs (b)(1), (c)(1), and (d)(1) of this section for the purposes of its data submittal is the Cold CO Test Procedure, performed in accordance with subpart C of this part.

(ii) *Testing by the Administrator.* The complete confirmatory test sequences that the Administrator may select to substitute for paragraph (b)(1) of this section are listed in paragraphs (b)(2)(ii) (A) through (C) of this section.

(A) Federal Test Procedure for exhaust emissions (except when performing evaporative test sequence) or for fuel economy testing, in accordance with subpart B of this part.

(B) Highway Fuel Economy Test Procedure, in accordance with part 600 of this chapter (which must follow a Federal Test Procedure).

(C) Cold CO Test Procedure, in accordance with subpart C of this part.

(c) *Soak*—(1) *Manufacturer's data submittal.* A vehicle soak prior to the wait time is optional if the CST sequence is performed as a stand-alone procedure. If the manufacturer elects to perform a Cold CO Test Procedure in conjunction with the CST as permitted in paragraph (b)(2) of this section, the soak and subsequent warmup are not conducted, and instead the procedure must move directly to the wait time step described in § 86.1437(b). If the test vehicle undergoes a soak period, it must be maintained at an ambient temperature within the temperature range specified in § 86.1430(c), for a period not to exceed 36 hours in duration, except as provided in paragraph (d)(1) of this section. Ambient temperature during soak periods must remain within the appropriate temperature range for the selected test option.

(2) *Testing by the Administrator.* (i) The test sequence may proceed directly to the wait time step described in § 86.1438(b) within 60 seconds of the end of vehicle operation conducted in accordance with paragraph (b)(2) of this section.

(ii) Optionally, the test vehicle may soak at an ambient temperature within the temperature range specified in § 86.1430(c), for a period up to 36 hours in duration, except as provided in paragraph (d)(2) of this section. If the Administrator opts to soak the test vehicle, warmup operation must be performed as described in paragraph (d)(2) of this section.

(d) *Warmup operation*—(1) *Manufacturer's data submittal.* Warmup operation is optional. Warmup consists of loaded operation over the first 505 seconds of the UDDS (in accordance with § 86.115 and appendix I to this part), or optionally, if the soak period has exceeded 36 hours, a full UDDS. Warmup operation must occur within the specific ambient temperature range for the selected test option, as given in table O-96-1 of § 86.1430.

(2) *Testing by the Administrator.* Warmup operation is performed if no transient operation of the type specified in § 86.1432(b)(2) is performed prior to the wait time, or if the optional soak exceeds 60 seconds. Warmup operation consists of, at a minimum, loaded operation over the first 505 seconds of

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the UDDS (in accordance with § 86.115 and appendix I to this part), or, if the soak period has exceeded 36 hours, a full UDDS. Warmup operation must occur within the specific ambient temperature range for the selected test option, as given in table O-96-2 of § 86.1430, except as specified in paragraphs (e)(2)(i) and (ii) of this section. Warmup operation must proceed immediately to the wait time step at § 86.1438(b).

(i) For moderate temperature testing utilizing Cold CO fuel only, the ambient temperature may not exceed 80 °F (27 °C) during warmup operation, or any of the succeeding steps in the CST sequence.

(ii) For the cold temperature pathway only, warmup operation must occur not only within the specific ambient temperature range indicated in table O-96-2 of § 86.1430, but must also occur within 5 °F (3 °C) of the selected test temperature.

§ 86.1433 [Reserved]

§ 86.1434 Equipment preparation.

(a) Immediately prior to the wait time portion of the test run described in § 86.1437 or § 86.1438, or immediately prior to warmup operation, the steps described in paragraphs (b) through (d) of this section must be performed.

(b) Check the device(s) for removing water from the exhaust sample and the sample filter(s). Remove any water from the water trap(s). Clean and replace the filter(s) as necessary.

(c) Set the zero and span points of the analyzer with the electrical spanning network or with analytical gases.

(d) Attach the tachometer to the vehicle in accordance with the analyzer manufacturer's instructions. The manufacturer must ensure, for all test and production vehicles and engines, that the rpm signal is capable of being read by an exhaust gas analyzer via:

(1) A conventional inductive tachometer; or

(2) The onboard diagnostics (OBD) connector, as described under the provisions of § 86.094-17; or

(3) A dedicated electrical lead, marked "rpm" and located under the hood, with a female-type, quarter-inch spade terminal. The digital transistor-

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transistor logic (TTL) signal must span the 0V-5V range at a rate of one pulse per engine revolution, synchronized to the top dead center position.

§§ 86.1435-86.1436 [Reserved]

§ 86.1437 Test run—manufacturer.

(a) This section describes the test run performed by the manufacturer for its data submittal pursuant to obtaining a certificate of conformity under the provisions of § 86.096-23. The test run consists of the wait time, vehicle preconditioning (optional), and the selected test procedure. The entire test run is performed in accordance with the conditions in the option selected from table O-96-1 of § 86.1430.

(b) *Wait time.* (1) If the vehicle is not already idling, the vehicle is started and allowed to idle freely with the transmission in neutral. The vehicle wait time begins when the vehicle engine speed is between 350 and 1100 rpm. The engine speed must attain the specified idle speed within ten seconds of beginning the idle period. A timer for the wait time portion of the test run will initiate (wt=0) when the vehicle is turned on or when it returns to idle after any transient test procedure, as described in § 86.1432.

(2) Following the first three minutes of idle, this wait time may be interrupted by engine off/restart cycles occurring no more frequently than every five minutes, with each engine off period having a maximum duration of two minutes. Each period of idle following a restart must be a minimum of three minutes in duration. During each idle period, the engine speed must not exceed 1100 rpm or fall below 350 rpm for more than five seconds in any one excursion. The total duration of the wait time, including time at idle and time during engine off periods, is 25 to 30 minutes.

(c) *Optional preconditioning.* Immediately following the wait time, the engine speed is increased to 2500± 300 rpm for 25 to 30 seconds or, optionally, the vehicle will undergo loaded operation for a minimum of 30 seconds between the speeds of 30 and 50 mph (48 to 80 kph). The period allowed for preconditioning commences upon attaining the specified rpm or speed range. No more

than ten seconds may elapse between terminating the wait time and attaining the specified rpm or speed range for preconditioning.

(d) Immediately following the wait time, described in paragraph (b) of this section, or, if performed, the optional preconditioning described in paragraph (c), the test procedure as described in paragraphs (e) through (g) of this section is performed on the test vehicle. The general requirements described in paragraphs (d) (1) through (4) of this section apply.

(1) *Exhaust gas sampling algorithm.* The analysis of exhaust gas concentrations begins ten seconds after the applicable test mode begins. Exhaust gas concentrations must be analyzed at a minimum rate of once every 0.75 second. The measured value for pass/fail determinations is a simple running average of the measurements taken over five seconds.

(2) *Void test conditions.* The test immediately terminates and any exhaust gas measurements are voided if the measured concentration of CO plus CO₂ falls below six percent or the vehicle's engine stalls at any time during the test sequence.

(3) *Multiple exhaust pipes.* Exhaust gas concentrations from vehicle engines equipped with multiple exhaust pipes must be sampled simultaneously.

(4) *Pass/fail determination.* A pass or fail determination is made for each applicable test mode based on a comparison of the short test standards contained in § 86.096-8(a) for light-duty vehicles and in § 86.096-9(a) for light-duty trucks, and the measured value for HC and CO as described in paragraph (d)(1) of this section. A vehicle passes the test mode if any pair of simultaneous values for HC and CO are below or equal to the applicable short test standards.

(e) *Test sequence—general requirements.* (1) The test sequence consists of an idle mode followed by a high-speed mode. The test timer starts when the conditions specified in this paragraph are met. The overall maximum test time is 290 seconds (tt=290). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing re-

sults by the expiration of the overall test time fails the test.

(2) The test sequence begins only after the requirements described in paragraphs (e)(2) (i) and (ii) of this section are met. If these conditions are not met within one minute upon completion of the wait time or, if performed, the preconditioning, the CST must be aborted.

(i) The vehicle is tested with the transmission in neutral or park and all accessories turned off. The engine must be at normal operating temperature (as indicated by a temperature gauge, temperature lamp, touch test on the radiator hose, or other visual observation indicating that overheating has not occurred).

(ii) The tachometer must be attached to the vehicle in accordance with the analyzer manufacturer's instructions.

(iii) The sample probe is inserted into the tailpipe to a minimum depth of 10 inches. If the vehicle's exhaust system prevents insertion to this depth, a tailpipe extension must be used, or the probe may be inserted into the tailpipe to CVS connector through an aperture provided for this purpose.

(iv) The measured concentration of CO plus CO₂ must be greater than or equal to six percent.

(f) *Idle mode.* (1) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum mode time is 30 seconds. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(2) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminated as described in paragraphs (f)(2) (i) through (iii) of this section.

(i) The vehicle passes the idle mode and the mode is terminated at the end of an elapsed time of 30 seconds (mt=30) if the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(ii) The vehicle passes the idle mode and the mode is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and

90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(iii) The vehicle fails the idle mode and the test is terminated if none of the provisions of paragraphs (f)(2) (i) and (ii) of this section is met by an elapsed time of 90 seconds (mt=90).

(g) *High-speed mode.* This mode follows immediately upon termination of the idle mode.

(1) The mode timer resets (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in pass/fail determination, the measured value is invalidated and the mode continued. If any excursion lasts for more than ten seconds, the mode timer resets to zero (mt=0) and timing resumes. The minimum high-speed mode length is determined as described in paragraph (g)(2) of this section. The maximum high-speed mode length is 90 seconds elapsed time (mt=90).

(2) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminated as described in paragraphs (g)(2)(i) through (iii) of this section.

(i) The vehicle passes the high-speed mode and the mode is terminated at the end of an elapsed time of 30 seconds (mt=30) if the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(ii) The vehicle passes the high-speed mode and the mode is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(iii) The vehicle fails the high-speed mode and the test is terminated if none of the provisions of paragraphs (g)(2) (i) and (ii) of this section is met by an elapsed time of 90 seconds (mt=90).

[58 FR 58426, Nov. 1, 1993; 59 FR 33913, July 1, 1994]

§ 86.1438 Test run—EPA.

(a) This section describes the test run performed by the Administrator for confirmatory testing pursuant to issuing a certificate of conformity under the provisions of § 86.091–29. The Administrator may also employ this procedure for Selective Enforcement Audit and recall purposes. For recall program testing, in-use vehicles will be set to manufacturer's specifications prior to conduct of the CST. The test run consists of the wait time, vehicle preconditioning, and the selected test procedure. The test run is performed in accordance with the conditions in the option selected from table O-96–2 of § 86.1430. If the CST is performed in conjunction with other confirmatory testing in accordance with § 86.1432(b)(2) and (c)(2), the vehicle must undergo the CST at the same specified ambient temperature range as that of the other confirmatory testing performed immediately prior to the optional vehicle soak, except as specified in paragraphs (a) (1) and (2) of this section.

(1) If the transient confirmatory testing was performed at the moderate temperature range specified in § 86.1430 and utilized Otto-cycle test fuel, it may optionally be followed by a CST sequence as described in § 86.1432 (b) and (c) at the warm ambient temperature range.

(2) If the transient confirmatory testing was performed at the moderate temperature range specified in § 86.1430 and utilized Cold CO test fuel, it may optionally be followed by a CST sequence as described in § 86.1432 (b) and (c) at the moderate ambient temperature range, except that if the ambient temperature exceeds 80 °F (27 °C) at any point for the remainder of the sequence from the wait time forward, a non-passing test result renders the test void.

(b) *Wait time.* (1) If the vehicle is not already idling, the vehicle is started and allowed to idle freely with the transmission in neutral. The vehicle wait time begins when the vehicle engine speed is between 350 and 1100 rpm. The specified idle speed range must be attained within ten seconds of beginning the idle operation. A timer for the wait time portion of the test run will initiate (wt=0) when it returns to idle

after any transient operation that occurs immediately prior to the wait time, as described in § 86.1432, or when the vehicle is restarted after being shut off prior to the wait time.

(2) Following the first three minutes of idle, this wait time may be interrupted by vehicle engine off/restart cycles occurring no more frequently than every five minutes, with each engine off period having a maximum duration of two minutes. Each period of idle following a restart must be a minimum of three minutes in duration. During each idle period, the engine speed must not exceed 1100 rpm or fall below 350 rpm for more than five seconds in any one excursion, except during the allowable engine-off periods. The total duration of the wait time, including time at idle and time during engine off periods, is three to 30 minutes.

(c) *Preconditioning.* Immediately following the wait time, the vehicle is preconditioned by increasing engine speed to 2500 \pm 300 rpm for a minimum of 30 seconds, or, optionally, the vehicle will undergo loaded operation for a minimum of 30 seconds between the speeds of 30 and 50 mph (48 to 80 kph).

(d) Immediately following the preconditioning described in paragraph (c) of this section, the test procedure as described in paragraphs (e) through (g) of this section is performed on the test vehicle. When the CST—Loaded Test as described in § 86.1439(d) is selected, the appropriate changes to dynamometer power absorption and inertia weight settings must be completed and the test sequence resumed as soon as possible following completion of preconditioning. The general requirements described in paragraphs (d) (1) through (4) of this section apply.

(1) *Exhaust gas sampling algorithm.* The analysis of exhaust gas concentrations begins ten seconds after the applicable test mode begins. Exhaust gas concentrations must be analyzed at a minimum rate of once every 0.75 second. The measured value for pass/fail determinations is a simple running average of the measurements taken over five seconds.

(2) *Void test conditions.* The test immediately terminates and any exhaust gas measurements are voided if the measured concentration of CO plus CO₂

falls below six percent or the vehicle's engine stalls at any time during the test sequence.

(3) *Multiple exhaust pipes.* Exhaust gas concentrations from vehicle engines equipped with multiple exhaust pipes must be sampled simultaneously.

(4) *Pass/fail determination.* For certification and Selective Enforcement Audit testing, a pass or fail determination is made for each applicable test mode based on a comparison of the measured value for HC and CO as described in paragraph (d)(1) of this section with the short test standards contained in § 86.096-8(a) for light-duty vehicles or in § 86.096-9(a) for light-duty trucks. For recall testing, a pass or fail determination is made for each applicable test mode based on a comparison of the measured value for HC and CO as described in paragraph (d)(1) of this section with the short test standards contained in § 86.708(a) for light-duty vehicles or in § 86.709(a) for light-duty trucks. A vehicle passes the test mode if any pair of simultaneous values for HC and CO are below or equal to the applicable short test standards.

(e) *Test sequence—general requirements.* The test timer starts only after the requirements described in paragraphs (e) (1) through (4) of this section are met. If these conditions are not met within one minute upon completion of the preconditioning, the CST must be aborted.

(1) The vehicle is tested with the transmission in neutral or park and all accessories turned off. The engine must be at normal operating temperature (as indicated by a temperature gauge, temperature lamp, touch test on the radiator hose, or other visual observation indicating that overheating has not occurred).

(2) The tachometer must be attached to the vehicle in accordance with the analyzer manufacturer's instructions.

(3) The sample probe is inserted into the tailpipe to a minimum depth of 10 inches. If the vehicle's exhaust system prevents insertion to this depth, a tailpipe extension must be used, or the probe may be inserted into the tailpipe to CVS connector through an aperture provided for this purpose.

(4) The measured concentration of CO plus CO₂ must be greater than or equal to six percent.

(f) When the requirements listed in paragraph (e) of this section have been satisfied, the procedure selected by the Administrator from among the emission tests described in § 86.1439 is performed on the test vehicle in accordance with the conditions prescribed in this section and §§ 86.1430 and 86.1432.

(g) If a certification test vehicle fails its initial confirmatory CST, a retest must be given in accordance with the provisions of § 86.091–29(a)(3)(iii)(B)(I) unless the manufacturer withdraws the vehicle from the certification process.

(1) A vehicle receiving a retest must re-enter the confirmatory pathway at either:

(i) The soak time step, as described in § 86.1432, or

(ii) The drain and fill step preceding the soak time option, as described in § 86.1432(b)(1), using the same type of fuel as was used in the initial CST. The vehicle may optionally be filled to the specified level defined in § 86.082 without being drained.

(2) A vehicle receiving a retest must either:

(i) Be maintained in the same ambient temperature range as that specified for the initial confirmatory CST (as described in § 86.1430(c)) from the termination of the initial confirmatory CST throughout the retest, or,

(ii) If the vehicle is exposed to ambient temperatures outside of the specified temperature range, before it enters the wait time it must be given a warmup consisting of a full Urban Dynamometer Driving Schedule procedure at the specified ambient temperature range for the initial CST. The test vehicle will be maintained at the same ambient temperature range as that specified for the initial confirmatory CST from this step throughout the remainder of the retest.

(h) *Multiple CSTs.* The Administrator may elect to conduct more than one type of CST on a test vehicle.

(1) If the Administrator elects to change fuels between one CST and a subsequent CST, the subsequent CST initiates at the drain and fill step described in § 86.1432(b)(1).

(2) If the Administrator elects to utilize the same fuel between one CST and a subsequent CST other than a retest, the Administrator may optionally initiate the subsequent CST at the vehicle soak step specified in § 86.1432(d).

[58 FR 58426, Nov. 1, 1993; 59 FR 33913, July 1, 1994]

§ 86.1439 Certification Short Test emission test procedures—EPA.

(a) The portions of the performance warranty test procedures described in part 85, subpart W of this chapter designated as “second-chance” which are analogous to the CST emission test procedures do not apply to the testing performed in accordance with this subpart. The Administrator selects from among the CST emission test procedures listed in paragraphs (b) through (f) of this section, which are incorporated into the vehicle test run at the point described in § 86.1438(f); that is, after the requirements of § 86.1438(e) have been satisfied.

(b) *CST—Two-speed idle test.* This test consists of an idle sampling mode followed immediately by a high-speed sampling mode. The test timer starts (tt=0) when the conditions specified in § 86.1438(e) are met. The overall maximum test time is 290 seconds (tt=290). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing results by the expiration of the overall test time fails the test.

(1) *Idle mode.* (i) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum mode time is 30 seconds. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminated as described in paragraphs (b)(1)(ii) (A) and (B) of this section.

(A) The vehicle passes the idle mode if the measured values are less than or equal to the applicable short test standards as described in § 86.1438(d)(4) prior to an elapsed time of 90 seconds (mt=90). If the vehicle passes, the mode

terminates immediately, or after an elapsed time of 30 seconds (mt=30), whichever comes second.

(B) The vehicle fails the idle mode and the test is immediately terminated if the requirements of paragraph (b)(1)(i)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(2) *High-speed mode.* This mode follows immediately upon termination of the idle mode.

(i) The mode timer resets (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in pass/fail determination, the measured value is invalidated and the mode continued. If any excursion lasts for more than ten seconds, the mode timer resets to zero (mt=0) and timing resumes. The minimum high-speed mode length is determined as described in paragraph (b)(2)(ii) of this section. The maximum high-speed mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminates as described in paragraphs (b)(2)(ii) (A) and (B) of this section.

(A) The vehicle passes the high-speed mode and the test is immediately terminated if, at any point prior to an elapsed time of 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in § 86.1438(d)(4).

(B) The vehicle fails the high-speed mode and the test is terminated if the requirements of paragraph (b)(2)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(c) *CST—Idle test.* This test consists of an idle sampling mode only. The test timer starts when the conditions specified in § 86.1438(e) are met. The overall maximum test time is 145 seconds (tt=145). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing results by the expiration of the overall test time fails the test.

(1) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum mode length is determined as described under paragraph (c)(2) of this section. The maximum mode length is 90 seconds elapsed time (mt=90).

(2) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (c)(2) (i) and (ii) of this section.

(i) The vehicle passes the idle mode and the test is immediately terminated if, at any point prior to an elapsed time of 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in § 86.1438(d)(4).

(ii) The vehicle fails the idle mode and the test is terminated if the requirements of paragraph (c)(2)(i) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(d) *CST—Loaded test.* This test consists of a loaded sampling mode followed immediately by an idle sampling mode. The test timer starts (tt=0) when the conditions specified in § 86.1438(e) are met, and the gear selector is in 'drive' for automatic transmissions, or in second gear (or third gear if more appropriate) for manual transmissions. The overall maximum test time is 240 seconds (tt=240). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing results by the expiration of the overall test time fails the test.

(1) *Loaded mode.* (i) The mode timer starts (mt=0) when the dynamometer speed is within the limits specified for the vehicle engine size according to the following schedule. If the dynamometer speed falls outside the limits for more than five seconds in one excursion, or 15 seconds over all excursions, the mode timer resets to zero and resumes timing. The minimum mode length is determined as described in paragraph (d)(1)(ii) (A) and (B) of this section. The maximum mode length is 90 seconds elapsed time (mt=90).

DYNAMOMETER TEST SCHEDULE

Gasoline engine size, no. cylinders	Roll speed, mph (kph)	Normal loading, brake hp (kilowatts)
4 or less	22–25 (35–40)	2.8–4.1 (2.1–3.1)
5–6	29–32 (47–52)	6.8–8.4 (5.1–6.3)
7 or more	32–35 (52–56)	8.4–10.8 (6.3–8.1)

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(1)(ii)(A) and (B) of this section.

(A) The vehicle passes the loaded mode if the measured values are less than or equal to the applicable short test standards as described in § 86.1438(d)(4) prior to an elapsed time of 90 seconds (mt=90). If the vehicle passes, the mode terminates immediately, or after an elapsed time of 30 seconds (mt=30), whichever comes second.

(B) The vehicle fails the loaded mode and the test is terminated if the requirements of paragraph (d)(1)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(2) *Idle mode.* (i) The mode timer starts (mt=0) five seconds after the dynamometer speed has reached zero and the gear selector is in 'park' or 'neutral'. The minimum idle mode length is determined as described in paragraph (d)(2)(ii) of this section. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(2)(ii)(A) and (B) of this section.

(A) The vehicle passes the idle mode and the test is immediately terminated if, at any point prior to an elapsed time of 90 seconds (mt=90), measured values are less than or equal to the applicable short test standards described in § 86.1438(d)(4).

(B) The vehicle fails the idle mode and the test terminates if the requirements of paragraph (d)(2)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(e) *CST—Preconditioned idle test.* This test consists of a high-speed preconditioning mode followed immediately by

an idle sampling mode. The test timer starts (tt=0) when the conditions specified in § 86.1438(e) are met. The overall maximum test time is 200 seconds (tt=200). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing results by the expiration of the overall test time fails the test.

(1) *Preconditioning mode.* The mode timer starts (mt=0) when the engine speed is between 2200 and 2800 rpm. The mode continues for an elapsed time of 30 seconds (mt=30). If engine speed falls below 2200 rpm or exceeds 2800 rpm for more than five seconds in any one excursion, or 15 seconds over all excursions, the mode timer resets to zero and resumes timing.

(2) *Idle mode.* (i) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum idle mode length is determined as described in paragraph (e)(2)(ii) of this section. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminates as described in paragraphs (e)(2)(ii)(A) and (B) of this section.

(A) The vehicle passes the idle mode and the test is immediately terminated if, at any point prior to an elapsed time of 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in § 86.1438(d)(4).

(B) The vehicle fails the idle mode and the test terminates if the requirements of paragraph (e)(2)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(f) *CST—Preconditioned two-speed idle test.* This test consists of a high-speed sampling mode followed immediately by an idle sampling mode. The test timer starts (tt=0) when the conditions specified in § 86.1438(e) are met. The overall maximum test time is 290 seconds (tt=290). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has

not yielded passing results by the expiration of the overall test time fails the test.

(1) *High-speed mode.* (i) The mode timer starts (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If the engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in the pass/fail determination, the measured value is invalidated and the mode continued. If any excursion lasts for more than ten seconds, the mode timer resets to zero (mt=0) and timing resumes. The high-speed mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (f)(1)(ii)(A) and (B) of this section.

(A) The vehicle passes the high-speed mode and the mode is terminated at an elapsed time of 90 seconds (mt=90) if any measured values are less than or equal to the applicable short test standards as described in § 86.1438(d).

(B) The vehicle fails the high-speed mode and the test is terminated if the requirements of paragraph (f)(1)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

(2) *Idle mode.* (i) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If the engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum idle mode length is determined as described in paragraph (f)(2)(ii) of this section. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (f)(2)(ii)(A) and (B) of this section.

(A) The vehicle passes the idle mode and the test is immediately terminated if, at any point prior to an elapsed time of 90 seconds (mt=90), the measured values are less than or equal to the ap-

plicable short test standards as described in § 86.1438(d)(4).

(B) The vehicle fails the idle mode and the test is terminated if the requirements of paragraphs (f)(2)(ii)(A) of this section are not satisfied by an elapsed time of 90 seconds (mt=90).

[58 FR 58426, Nov. 1, 1993; 59 FR 33913, 33914, July 1, 1994]

§§ 86.1440–86.1441 [Reserved]

§ 86.1442 Information required.

(a) *General data.* The information listed in paragraphs (a) (1) through (14) of this section must be recorded with respect to each CST. Elements of this general data may be located separately from the CST emission data, as long as the general data can easily be presented together with the CST emission data when a complete data set for the vehicle is desired.

(1) Test number.

(2) Vehicle description, including engine family code, vehicle ID number, version number, manufacturer, number of cylinders, equivalent test weight, weight class and odometer reading.

(3) Date and time of day for the test.

(4) Driver and equipment operator IDs.

(5) Gas analyzers: Analyzer bench ID, analyzer ranges, recordings of analyzer output during zero, span, and sample readings.

(6) Recorder charts or computer printouts: Test number, date, vehicle ID, operator ID, and identification of the measurements recorded.

(7) Soak area ambient temperature (°F).

(8) Test cell ambient temperature (°F), barometric pressure, and humidity. (A central laboratory barometer may be used, provided that individual test cell barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.)

(9) Test fuel: RVP and type (Otto-cycle test fuel or Cold CO test fuel).

(10) Warmup operation performed, for example, none, full Urban Dynamometer Driving Schedule (UDDS), first 505 seconds of the UDDS, other confirmatory test procedure, other transient operation.

(11) Wait time characteristics, including total time and engine off/re-start cycle schedule.

(12) Preconditioning; duration and type, for example, minimum 2500 rpm idle or minimum 30 mph (48 kph) loaded steady state operation.

(13) CST procedure type, as described in § 86.1439.

(14) Dynamometer ID.

(b) *CST emission data.* For each CST, the information listed in paragraphs (b) (1) through (3) of this section must be recorded with respect to each sampling mode.

(1) The reported exhaust concentrations, i.e., those for which the product of $HC = (151 \cdot CO)$ is at a minimum.

Round initial test results to the number of decimal places contained in the respective standards expressed to one additional significant figure; round final test results to the number of decimal places contained in the respective standards. Rounding is done in accordance with ASTM E 29-90, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications. This procedure has been incorporated by reference (see § 86.1).

(2) The test time and mode time at which the reported exhaust concentrations are at a minimum.

(3) Minimum $CO = CO_2$ concentration (if applicable).